

# Powerful Scientific Computation Low-Cost Business Data Processing

ARCA  
SCIENTIFIC  
301

$$A_{ij} = \sum_{k=1}^N b_{ik} C_{kj}$$

# High-Performance Arithmetic Enhances Scientific Capabilities

## IMPROVED FOR DUAL PURPOSE

The outstanding economy and efficiency of the RCA 301 electronic data processing system for general purpose applications are now extended to powerful scientific computation with an optional high-speed, fixed and floating point arithmetic unit.

Advanced features associated with wired-in arithmetic impart microsecond scientific calculation ability to this system's proven-in-use excellent capabilities on business data processing. For example, a  $10 \times 10$  matrix inversion, whose execution time is 12.5 seconds when programmed for the 301's fast table look-up arithmetic, is completed in one second by the Model 354 Processor with the high-performance arithmetic unit.

For business organizations with a substantial volume of scientific computation along with accounting, record keeping and management science requirements, a Scientific 301 offers the economic advantages of a single low-cost computer system and a level of performance normally expected in larger and more costly systems. System designs use modular forms to make expandability economical and easy... to fit users' needs now and in the future.

## GENERAL 301 FEATURES

- Advanced, all solid-state design.
- Compact size, moderate power and air conditioning requirements.
- Processor models with 10,000, 20,000 and 40,000 memory positions.
- 7-microsecond memory cycle.
- Optional simultaneous mode for parallel input/output with each other or with compute.
- Options of all input/output functions in general use.
- 3 options in magnetic storage: tape systems in three speed and capacity ranges; modular Data Disc Files for millisecond random access; Data Record Files for lowest-cost mass storage.
- Variable data format for economic utilization of magnetic tape and core memory capacity.
- 2-address instructions, indirect addressing, bi-directional orders, access to register settings, tally and repeat instructions.

## HIGH-PERFORMANCE ARITHMETIC FEATURES

- High-Speed Arithmetic Unit optional in processor with 20,000 and 40,000 memory positions.
- A family of powerful new instructions for wired-in fixed and floating point add, subtract, multiply and divide, and shift and store accumulator.
- Double precision arithmetic facilitated by address 16-digit Accumulator-PR Register.
- Automatic modification of the new high-performance arithmetic instructions provided by 3 indexing fields.
- Incrementing of indexing fields to facilitate iteration plus indirect addressing, reduce need for address manipulating instructions.
- 8-digit fixed point operands, 8-digit mantissa plus 2-digit exponent floating point operands for scientific accuracy.
- Sensing on bits for signs and for logical operations.
- Wide exponent range from  $10^{-99}$  to  $10^{+99}$ .



# Features Directed Toward Ease and Efficiency in System Utilization

## USER-ORIENTED DESIGN

Design features of the RCA 301 high-performance arithmetic systems are directed to fast and easy solution of mathematical problems by professional personnel.

For example, the 301 memory organization is decimal-oriented for ease of understanding.

A single character can depict alphabetic and numeric characters, punctuation marks, signs and symbols. Bit sensing is used for signs and for logical operations which require special, separate instructions in other systems.

In floating point operations, the numeric values of operands are expressed by the eight digits of the mantissa, and their magnitudes by the two digits of the exponent. The exponent range—from  $10^{-99}$  to  $10^{99}$  is also larger than in many other scientific computers.

## HOW 301 GETS ITS SPEED

The combination of existing RCA 301 features with high-speed arithmetic circuitry accelerates two-address floating point add and subtract times to 147 microseconds, and floating point multiply to an average 462 microseconds for eight-digit operands with two-digit exponents.

A family of powerful new instructions enhance complex scientific operations so that over-all functional effectiveness is stepped up for complete calculations. Thus the 301 gains very favorable comparative execution rates for the spectrum of arithmetics normally employed in the solution of a specific scientific problem.

The parameters of 301 performance are indicated by its ability to complete 6,000 separate eight-digit additions or subtractions, and approximately 2,000 average multiplications and divisions—fixed or floating point—per second.

## SOFTWARE EXPLOITS FEATURES

To exploit its high performance arithmetic features, the RCA 301 Scientific System will be implemented with an easy-to-use software package, including UMAC—an algebraic compiler employing Fortran mathematical statements.

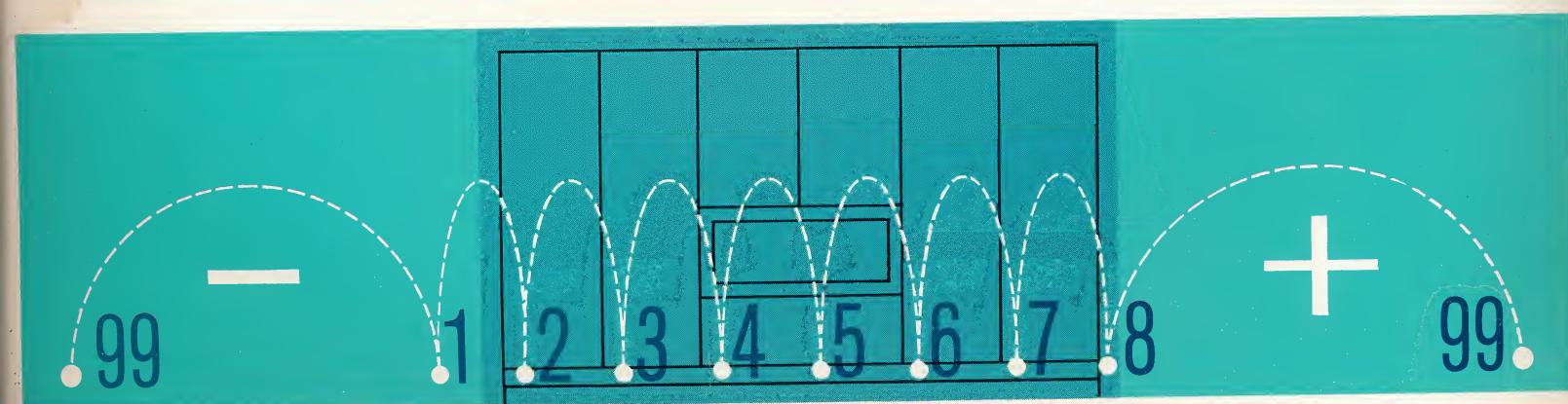
UMAC (University of Miami Algebraic Compiler) accepts a problem-oriented language which requires only a minimum of system training. It also opens to 301 users the vast body of scientific and engineering applications programmed in Fortran language.

There will also be available the RCA 301 Scientific Interpreter System, and two Bell Interpretive Systems, the standard System 1 and L<sub>2</sub> General Interpretive System. The Scientific Interpreter provides the additional flexibility, efficiency and speed of writing scientific programs in a mathematical pseudo-language, while the Bell Interpreters add a widely-used, compatible language to the 301 applications library.

A complete library of scientific subroutines will be made available to include:

- Square Root and Transcendental Subroutines
- Matrix Arithmetic Subroutines
- Multiple Regression and Correlation Program
- Simplex Linear Program
- Transportation Linear Program
- Least Squares Polynomial Fit Program
- Roots of Polynomial Program
- Analysis of Variance Programs
- Scientific Data Edit Routines
- Double Precision Floating Point Routines
- Complex Arithmetic Subroutines

Interchange of information and methods among RCA EDP users is facilitated by the PAL Program Application Library and continuing customer information bulletins, and supported by scientific applications specialists.



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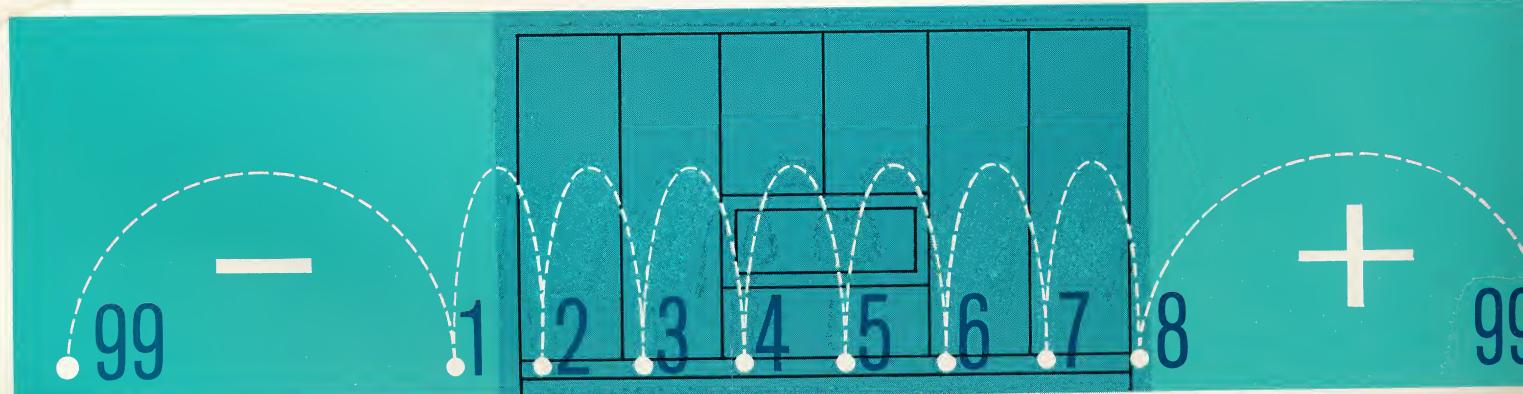
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## POWERFUL MULTI-TAPE BUSINESS/SCIENTIFIC SYSTEM

- Processor with 20,000 positions of fast core memory, arithmetic unit, input/output simultaneity.
- Hi-Data Tape Group with six magnetic tape decks.
- Card reader, card punch—for input/output with 80-column punched cards.
- On-Line Printer—120 character positions, 1,000 lines per minute.
- Easily expandable to 40,000-position memory, increased storage and input/output speeds and capacity, and additional input/output functions.
- All existing 301 programs will continue to run on enhanced system with wired-in arithmetic.

## EXPANDED FOR DUAL PURPOSE

The RCA 301 with high-performance arithmetic offers the lowest cost systems in the industry for handling a "mix" of conventional business data operations in the medium class volume range, along with substantial requirements for scientific calculation. The expanded general purpose system shown below at \$8,140 per month typifies the 301's "more work power per dollar" For business data operations, which essentially involve large volume filing, handling, and

sifting of routine business information, this system provides fast and varied inputs and outputs to exploit the large and fast memory and fast internal operations of the 301 system. The six magnetic tapes in this system's Hi-Data Tape Group are economical for fast and efficient file maintenance in business applications, and for storage of very large scientific problems, such as linear programming, to supplement the large internal memory capacity of the 301.

For both types of applications, an optional processor with 40,000 memory positions lets users handle larger and more complex problems in less system time.



## BASIC RCA 301

### SCIENTIFIC SYSTEM

- Processor with High-Speed Arithmetic Unit, 20,000-character memory.
- Paper Tape Reader-Punch—for input/output at 100 characters per second.
- Monitor Printer—for hard copy output at 10 characters per second.

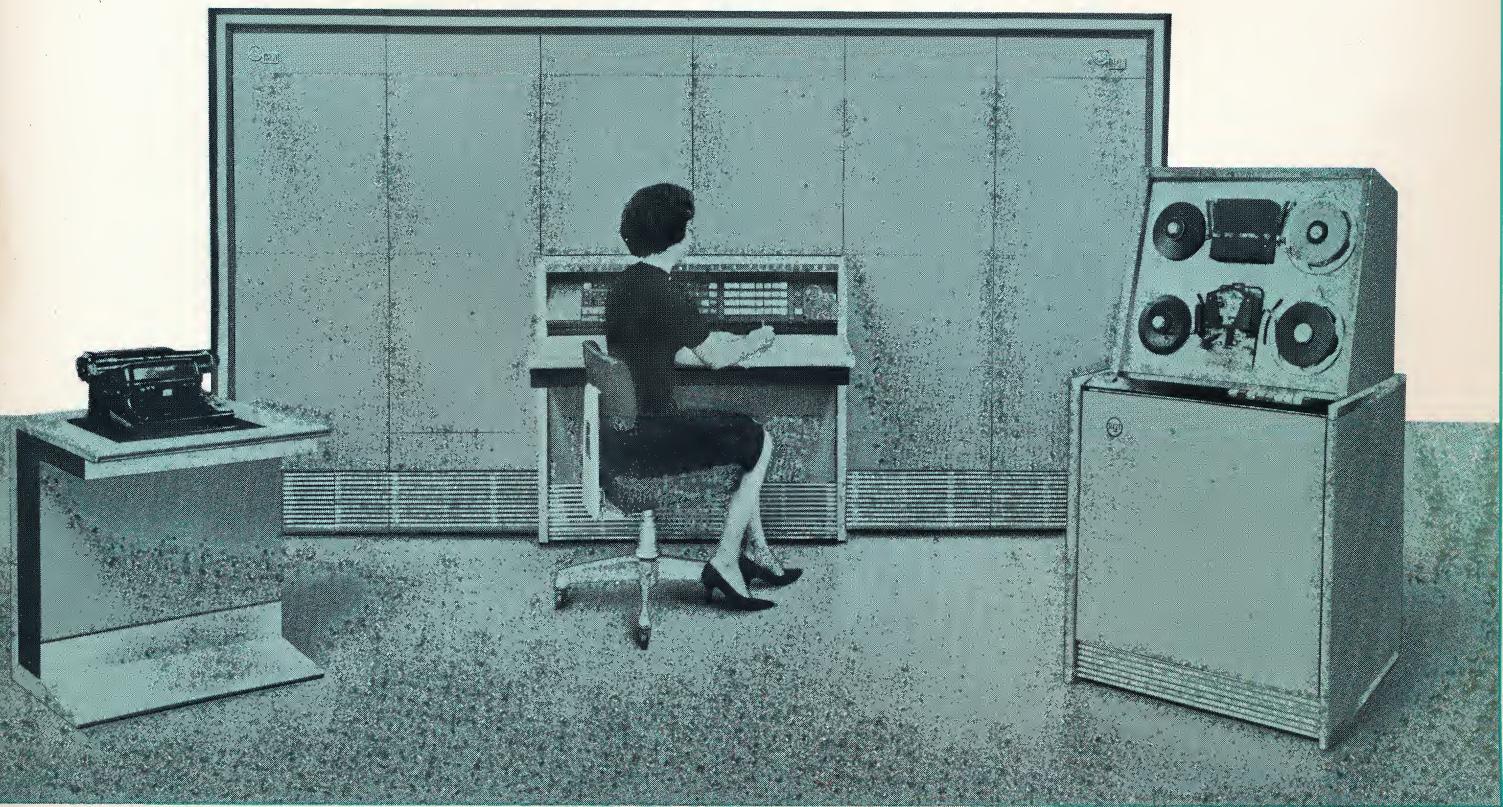
### POWERFUL SCIENTIFIC COMPUTATION

For purely scientific applications, requiring large volume, complex computation and a minimum of input/output, the basic RCA 301 configuration shown below offers all the performance features of this system at minimum cost—\$4,495 a month.

In organizations presently employing a number of slower, desk-type scientific computers, this basic RCA 301 Scientific

System may offer potential savings in equipment rental costs and much faster solution of mathematical problems.

An extensive variety of options is available for this system. As in all 301 configurations, there is no penalty for growth. Both peripheral devices and their controls need be added only when required, and may be removed or changed if operations change.



# RCA SCIENTIFIC 301

For further information, phone or write a nearby RCA EDP Sales Office:

- ATLANTA, Suite 1201, Georgia Power Bldg., 270 Peachtree St., 525-6547
- BOSTON, 886 Washington St., Dedham, DA 6-8350
- CHICAGO, Room 220, Morton Salt Bldg., 110 N. Wacker Dr., ST 2-0700
- CLEVELAND, 1600 Keith Bldg., 1621 Euclid Ave., CH 1-3450
- DALLAS, 7901 Carpenter Freeway, ME 1-3050

- DENVER, Suite 1210, Mile High Center Bldg., 1700 Broadway, AL 5-3694
- DETROIT, 19th Floor, Fisher Bldg., TR 2-5440
- HARTFORD, 80 Farmington Ave., JA 7-4143
- LOS ANGELES, RCA Bldg., 1550 N. Vine St., HO 6-4101
- MIAMI, 304 Palermo Ave., Coral Gables, 445-5487
- NEW YORK CITY, (Downtown) 44 Beaver St., HA 2-1811; (Midtown) 1250 Avenue of Americas, JU 6-3800

- PHILADELPHIA, Suite 1909, 2 Penn Center Plaza, LO 8-8150
- PITTSBURGH, 222 Four Gateway Center, CO 1-1080
- SAN FRANCISCO, 343 Sansome St., YU 1-5600
- SEATTLE, 1111 Washington Bldg., 1325 Fourth Ave., MA 4-8900
- ST. LOUIS, 7710 Carondelet Ave., Clayton, PA 6-5322
- SYRACUSE, Room 302-303, State Tower Bldg., GR 4-5337
- WASHINGTON, 1725 "K" St., N.W., FE 7-8500



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